FOUNDRY TRADE JOURNAL
Established 1902
WITH WHICH IS INCORPORATED THE IRON AND STEEL TRADES JOURNAL

Vol. 67 Thursday, August 6, 1942 No. 1355

A Works Visit

The particular works we visited has no foundry, but is a large user of castings. It is probably due to this fact that its management is less sympathetic to castings than those which have foundries attached to them as a manufacturing department. The works' metallurgist, exceptionally, was an ardent, though critical, advocate of the extended use of castings. His views are worth recording as indicative of the steps necessary to be taken for ensuring the future stability of the industry. He asserted that there had been a remarkable improvement in the mechanical strength and soundness of grey-iron castings in recent years, especially when made by firms utilising enlightened metallurgical control. Dimensional accuracy, however, still needs attention. He had in his laboratory under investigation a complicated pump casting, which had failed in service. When sectioned it disclosed (*a*) excessive corrosion leaving graphite flakes in relief at the working surfaces; (*b*) draws at all the metal junctions; (*c*) many porous places and blowholes; (*d*) extreme and dangerous variation in the inner wall-sections; and (*e*) a microstructure to be associated with a complete lack of metallurgical control. This, in the metallurgist's opinion, was the sort of happening which prejudiced designers against castings. Light alloy castings, in his opinion, were not uniformly satisfactory, and, unlike grey iron, it was not the firms with a superabundance of metallurgical supervision which produced the finest castings, but some concerns of relatively modest dimensions possessing, no doubt, a wealth of practical experience. Light alloy die castings never attained the satisfactory levels reached by hot pressings. Steel castings he did not use. The most important statement he made was that, when in conference with Service technicians considering the design and manufacture of a new component, any suggestion as to the suitability of a casting was ruled out without discussion! Asked for his advice as to how to popularise castings with designers, he suggested that, as the two main factors were dimensional accuracy and internal soundness, the remedies were obvious. For the former, greater attention must be paid to the production and maintenance of patterns, core-boxes, core carriers, gauges, jigs and box parts, coupled with rigid inspection. For the second, every foundry must have an X-ray apparatus and unceasingly apply remedies to any faults disclosed. Finally, there must be enlightened publicity to overcome the present prejudice existing in high quarters.

To what extent this gloomy picture represents general opinion it is difficult to gather, as local environment has a profound influence, and it is possible to paint a second picture which would reverse perspective, tint, and shadow. One of the most successful of British aero engines incorporates a quantity of castings. These, at low cost, have responded magnificently to every test, both shop and operational, imposed upon them. We grant that there is a tendency towards making as many die castings as possible, because of speed of production. The works, like many others, had had to sacrifice much of its peacetime production, and concentrate on war work of a light engineering character. At one point in the tour we were called to attention by the loud speaker and listened to the voice of the managing director. His message was to the effect that the most important contract they had ever received would shortly be put into production. The tooling up was finished and, as could be taken for granted, the tool room had done a real good job of work. The machine tools were lined up ready for going ahead. Experts from the main contractors would be in attendance in the

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CORRESPONDENCE

[We accept no responsibility for the statements made or the opinions expressed by our correspondents.]

MOULD AND CORE DRYING

To the Editor of THE FOUNDRY TRADE JOURNAL.

SIR,—I venture to express my opinion on some contents of your leading article on "Foundry Fuel Economy," in No. 1353, regarding mould and core drying. It is said there: "There is still too little appreciation of the fact that clothes cannot be dried for weeks on end in damp tropical climates."

The underlying conception that a dry atmosphere or dry air is required for drying materials is correct only for materials like timber, leather, textiles, foodstuffs, etc., which have to be dried at a temperature below the boiling point of water, because their fibre would be destroyed at a higher temperature. The same conception is, however, wrong and misleading as regards drying materials like sand, clay and refractories such as used for moulds and cores. The drying of the latter materials is not a process of absorbing moisture by dry air at a temperature below the boiling point of water, but a process of evaporating water at or above the boiling point.

The water contents of moulds and cores can be boiled off and no dry air is needed when raising steam in a boiler.

If a mould has to be dried throughout, its centre must reach a temperature which will boil off the water content at a certain pressure of steam, sufficient to drive the steam through the bulk of sand. The corresponding temperature required at the outer surfaces of the mould depends on the thickness of the bulk of sand, and its conductivity of heat. With very thick moulds, outer temperatures of 300, 400 or even 500 deg. may be required to reach, say, a temperature of 120 deg. C. in the centre of the mould within a certain time, evaporating in that time a certain amount of water.

The problem of efficient drying of moulds and cores has therefore nothing to do with dry atmosphere inside the stove, but resolves itself into the task of efficient generation, distribution and transmission of heat at a certain temperature to bodies. Efficient drying of moulds and cores in a large stove requires a very large volume of hot gases passing through it at a high velocity. The hot gases may be anything, products of combustion, or superheated steam or both mixed. Recirculation of both at a high rate using the fire only for admixture and for maintaining the temperature is evidently the most economical and efficient method of drying, as it ensures not only uniform temperature good transmission of heat, but also recuperation of heat and, therefore, economical consumption of fuel.—Yours, etc.,

D. NEUSTADTER.

8, Moorland Court,
Melville Road, Birmingham, 16.
July 27, 1942.

[We thank our correspondent for his interesting commentary on our leader.—EDITOR.]

"FALLING" BLAST-FURNACE SLAGS

Dr. T. W. Parker and Mr. J. F. Ryder, of the Building Research Station, D.S.I.R., Garston, Herts, are presenting to the Iron and Steel Institute a Paper on "Investigations on 'Falling' Blast-Furnace Slags," which confirms that the basic cause of falling is the inversion of the high-temperature crystalline form of $2CaO.SiO_2$ to the low-temperature form, with accompanying expansion. Measurement of expansion does not, however, provide an accelerated test for falling. A test, previously proposed by A. Guttmann, making use of the ultraviolet lamp, tends to err on the unsafe side. Two new tests are proposed, both based on using only slag in which no $2CaO.SiO_2$ is present. One of these, suitable for slags which are cooled slowly, *e.g.*, by the "ball" method, depends on the use of an equation, introducing the analytical values for the oxide constituents, and is based on phase equilibrium in the systems, making use of the "suspended equilibrium" hypothesis. The other is a microscope tests with polished specimens etched with a reagent which, in blast-furnace slags, is more or less specific for $2CaO.SiO_2$. These two tests err slightly on the safe side.

THE INSTITUTION OF AUTOMOBILE ENGINEERS

The Research Department was inspected by the Technical Press last week. The most interesting piece of work in progress is concerned with power loss accompanying the change to producer-gas operation, and methods for restoring the power output to that obtained with petrol. A standardised Government "emergency" type gas producer is used and modifications to the engine and accessories are carried out to induce improvements. Of ultimate interest to our readers are the researches now in progress on the fatigue strength of crankshafts and the durability and wear of bearings.

A WORKS VISIT

(*Concluded from previous page.*)

dining room to explain to the operatives exactly what functions the gadget played in aerial warfare and the importance of each component. Moreover, there were to be three film shows which would underline the extreme importance of the gadget and the care needed in its production. He concluded his short address with an appeal to save fuel, light and water throughout the whole of the works. The last department to be visited was the power station, where the whole of the piping had been welded. After a dozen leaks had occurred, the original contractors had, at their own cost, re-welded the whole job, substituting in the more crucial positions flanged joints. We left the works feeling that industries other than the foundry had their troubles also.

BLAST CONTROL IN THE FOUNDRY CUPOLA

By S. A. HERRES* and C. H. LORIG†

Being the Technical Supplement to the Fifth Edward Williams Lecture: Foundry Teamwork, by Dr. H. W. Gillett, read at the Annual Conference of the Institute of British Foundrymen on June 20

The foundry cupola has long produced cast iron under operating conditions which amaze most metallurgists. There are scarcely any limits to the size, quantity, or quality of the scrap, pig-iron, fuel, or flux which have been used. Metal has been produced from almost any design of cupola operated with little or no real attempt at control. An unusually large number of compensating variables tend to produce iron of a kind even when the amounts of charge materials and blast differ widely from plant to plant and from time to time in the same cupola.

When, by chance in uncontrolled cupola melting, certain quantities of metal, coke and air are brought together under favourable conditions, the molten product will have excellent properties. But the use of a given grade of iron from a certain cupola must be governed by minimum, not maximum, properties. To meet more rigid specifications of physical properties, or more difficult casting conditions, some standardisation of the melting operation is required.

A working theory of the cupola must depend on a complete understanding of the reactions taking place during melting. Because of the large number of variables concerned, because the speed of cupola melting is too great to allow many of the possible reactions to proceed to equilibrium, and because our means of observing the procedure of high temperature reactions are rather limited, such a theory has not yet been worked out. However, a study of the chemical and physical properties of the raw materials and products of the cupola allows certain conclusions to be made in the effort to develop the cupola into the precise melting tool we may expect of the future.

Standard Conditions Necessary

To obtain uniform temperature and melting rate in the cupola, it is necessary to standardise: The quantity and quality of the coke and metal charges; the ratio of oxygen in the air blast to carbon in the coke; and the conditions under which the oxygen and carbon are brought together.

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† Supervisor, Foundry Department, Battelle Memorial Institute.

The latter condition depends on the amount of surface of coke exposed to air, the velocity of the air, and secondary reactions and catalysts which affect the rate and degree of completion of the reaction between oxygen and carbon. In the foundry, these conditions may be considered constant and neglected when: (1) Coke size, porosity, and chemical analysis are held reasonably constant; in other words, when a satisfactory coke is bought from a dealer who can be relied upon to supply coke with uniform chemical and physical properties. (2) The melting zone and tuyere ratios are held constant, or when the melting zone is patched to correct size after each heat with a grade of refractory which will not burn away excessively, and when the tuyeres are kept free of slag. (3) Charging practice is uniform and no excessively large or very fine material is charged, *i.e.*, there should be no bridging (hang-ups) or channelling of charges. (4) Uniform kind and quality of flux is used, slagging is satisfactory, and no large amount of air escapes through the slag hole.

The coke-to-metal ratio which gives the best results may be found by experiment for a given coke and a certain metal charge. Any change in coke quality or size, or change in metal mix, will require a change in coke ratio for optimum results. For example, an increase of steel in the mix, or the use of large pieces of iron scrap, will require more coke for melting.

Oxygen-to-Carbon Ratio

When all other factors have been taken into account, the efficiency of cupola melting will be largely dependent on the oxygen-to-carbon ratio. Performance of a particular cupola as judged by quality and temperature of metal at spout, melting losses, and economy of coke consumption, is most satisfactory when a certain critical quantity of oxygen is supplied to burn the coke. This quantity may be found by experiment, provided the operator can measure and control the amount of oxygen blown into the cupola for a given amount of coke. To determine it, one should first examine all losses of air in the entire blast system. Any serious and variable loss of air beyond the point of measurement of air blast will invalidate

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any readings obtained. One should then examine the method of measuring the air. A pressure gauge gives valuable information about the conditions inside the cupola, but is of no use in determining the amount of air blown into the cupola. A differential gauge of the usual Pitot or orifice

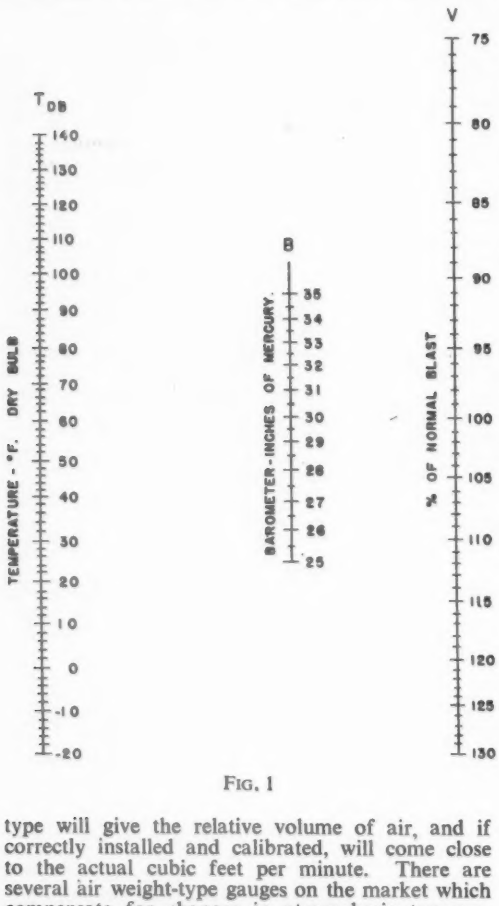

FIG. 1

type will give the relative volume of air, and if correctly installed and calibrated, will come close to the actual cubic feet per minute. There are several air weight-type gauges on the market which compensate for changes in atmospheric temperature and pressure and, excepting the single factor of humidity, give automatically a constant weight of oxygen.

Provided the volume is determined by a differential type of volume meter, a simple correction can be made with the aid of a chart, such as shown in Fig. 1, to obtain a given weight of oxygen per unit time. Temperature and barometer readings are taken at a protected point near the blast intake (the thermometer should be shielded from radiant heat, either from the sun or a nearby furnace). A straight-edge placed in line with the temperature reading on Scale T_{DB} of Fig. 1 and the barometer reading on Scale B gives the percentage of normal blast on Scale V. The cubic feet per minute of blast desired (for normal conditions) is multiplied by this percentage, and the blast control regulated to give the volume reading obtained as the product.

By always making this correction to normal conditions, the same weight of oxygen per cub. ft. will be blown into the cupola, regardless of conditions of temperature and pressure. Of course, temperature and pressure may vary through the day. How often the blast should be changed depends on the accuracy of blast measurement obtainable and the degree of control desired.

Effect of Moisture on Ratio

The amount of moisture in the air also has an effect on the oxygen-to-carbon ratio. Compared with the effects of temperature and pressure, the influence of moisture is minor. Some foundries, however, are troubled with changes in atmospheric humidity. A few of these have installed air conditioners to ensure a constant moisture content in the air blown into their cupolas.

One foundry corrected for the amount of carbon required to dissociate the moisture in the blast by adding extra coke on days when the humidity was high.* Coke to supply heat for the endothermic reaction and to heat the moisture in the air to reaction temperature was not taken into account. Fig. 3 shows the total amount of coke to compensate for all these factors, also the increase in blast required to compensate for the humidity. The amount of coke per hour, determined by following a vertical line to the bottom of the chart from the intersection of the blast rate (horizontal) and humidity (sloping) lines, should be divided equally over the regular coke charges for one hour. Humidity corrections are made after applying the correction of Fig. 1, and on the basis of the actual volume of blast entering the cupola.

Before Fig. 3 can be used, the grains of moisture per cub. ft. of blast must be determined and corrected for standard conditions. Humidity is determined by dry bulb (ordinary thermometer) temperature, barometer, and wet-bulb temperature.

* "Dwyer, P. "Cupolas Supply Iron Continuously," The Foundry, November, 1934, pp. 28-31, 72.

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Wet-bulb temperature may be measured by whirling a sling psychrometer, preferably of the type recommended by the U.S. Weather Bureau, in the vicinity of the blast intake and taking readings. However, the calculation of humidity from these three variables is rather difficult, and the usual form of psychrometric chart is not a great deal of help.

Determination of Humidity

Fig. 2 has been worked out in an attempt to simplify the determination of humidity for blast calculations. A straight-edge placed through the dry-bulb temperature on Scale T_{DB} and the wet-bulb temperature on Scale T_{WB} will give a reading on Scale G of the grains of water per lb. of dry air. The straight-edge is then placed through the dry-bulb temperature on Scale T_{DB} and the intersection of the wet-bulb and dry-bulb lines at the right-hand side of the page, and a reading of cub. ft. of air plus water vapour per lb. of dry air is taken on Scale D. Dividing the first reading by the second and making the indicated barometer correction gives the grains of water vapour per cub. ft. of air actually entering the cupola.

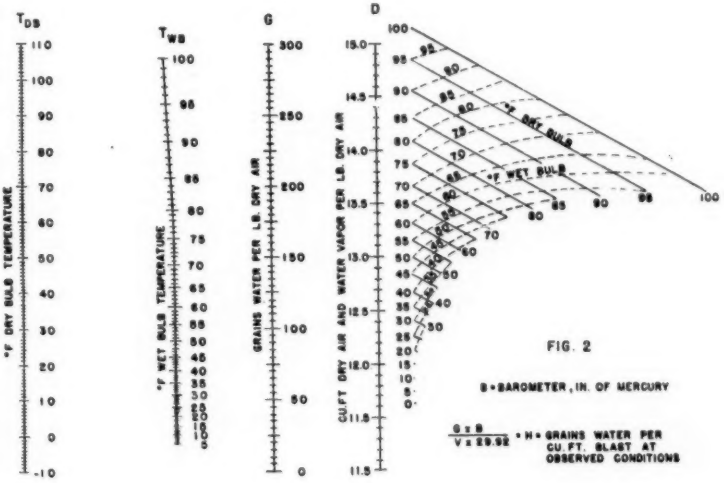
°F DRY BULB TEMPERATURE
°F WET BULB TEMPERATURE
GRAINS WATER PER LB. DRY AIR
CU.FT DRY AIR AND WATER VAPOR PER LB. DRY AIR
°F DRY BULB
°F WET BULB
B = BAROMETER, IN. OF MERCURY
G = GRAINS WATER PER CU. FT. BLAST AT OBSERVED CONDITIONS

FIG. 2

The crossing lines at the right-hand side of Fig. 2 are necessary because the volume of a lb. of air varies with the per cent. saturation. Dry bulb (sloping) and wet bulb (dotted) lines intersect at the top of dry bulb line when the two temperatures are equal. This indicates that the air is completely saturated with water vapour. Points down and to the right on dry bulb temperatures show that the air is only partially saturated and will occupy less volume per lb. of dry air. The lower end of dry bulb temperature line is for completely dry air.

Figs. 2 and 3 may also be used in connection with air-weight blast control. Obtain readings on Scales G and D, Fig. 2, as above. Let W = lbs. of air per min. as indicated by air weight meter. Then, $W \times (1 - G/7000) \times D$ = cub. ft. of air per min. for use in Fig. 3.

Conclusions

Every foundry interested in maintaining quality and economy in connection with cupola melting practice should base air blast supply on a constant weight of oxygen. Supervision and control equipment for making the temperature-pressure correction, as outlined above, will prove an economical investment. Many foundry manuals give instructions for installing home-made volume meters, and the cost of a barometer and thermometer is nominal.

Where a critical type of casting is made, and where intelligent supervision and close control are available, compensation for humidity changes should also be made.

EXAMPLES OF BLAST CORRECTION

I—Hot Summer Day

Observed conditions: 100 deg. F. dry bulb temperature; 85 deg. F. wet bulb temperature; 28 in. of mercury, barometer reading; 10,000 cub. ft. per

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min. of dry air at standard conditions = base blast figure.*

Refer to Fig. 1.—A straight line through 100 deg. F. on Scale T_{BD} and through 28 in. of mercury on Scale B gives 115 per cent. on Scale V.

10,000 × 115/100 = 11,500 cub. ft. per min.

Refer to Fig. 2.—A straight line through 100 deg. F. on Scale T_{DB} and 85 deg. on F. on Scale T_{WB} gives 160 grains per lb. of dry air on Scale G. A straight line through 100 deg. F. on Scale T_{DB} and the intersection of 100 deg. F. dry bulb (solid line) and 85 deg. F. wet bulb (dotted line) gives 14.65 cub. ft. on Scale D.

$$\frac{160 \times 28}{14.65 \times 29.92} = 10.2$$ grains of water per cub. ft. of blast.

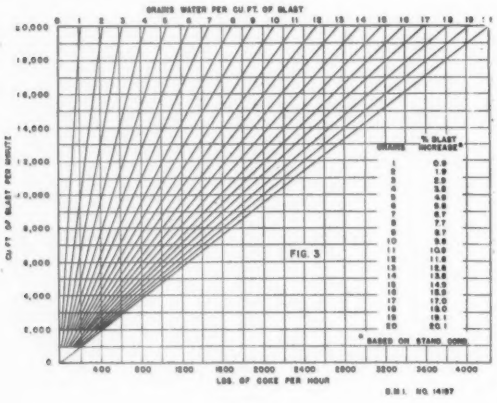
GRAINS WATER PER CU FT. OF BLAST
CU FT. OF BLAST PER MINUTE
LBS. OF COKE PER HOUR
GRAINS
% BLAST INCREASE*
FIG. 3
* BASED ON STAND. COND.

FIG. 3

Refer to Fig. 3.—Find intersection of 11,500 cub. ft. (horizontal line) and 10.2 grains (sloping line). A vertical line to bottom of chart from this intersection shows that 1,235 lbs. of coke should be added to base coke charges† each hour.

The table on Fig. 3 shows that for 10.2 grains the blast should be increased 10 per cent. (correction based on standard conditions). Correcting this figure to observed conditions by means of the result already obtained from Fig. 1 gives: 10.0 × 115/100 = 11.5 per cent.

11,500 + 11,500 × 11.5/100 = 12,820 cub. ft. per min.

II—Winter Day

Observed conditions: 35 deg. F. dry bulb temperature; 25 deg. F. wet bulb temperature; 30 in. of mercury, barometer reading; 10,000 cub. ft. per min. of dry air at standard conditions = base blast figure.

Refer to Fig. 1.—A straight line through 35 deg. F. on Scale T_{DB} and through 30 in. of mercury on Scale B gives 95 per cent. on Scale V.

10,000 × 95/100 = 9,500 cub. ft. per min.

Refer to Fig. 2.—A straight line through 35 deg. F. on Scale T_{DB} and 25 deg. F. on Scale T_{WB} gives 3 grains per lb. of dry air on Scale G. A straight line through 35 deg. F. on Scale T_{DB} and the intersection of 35 deg. F. dry bulb (solid line) and 25 deg. F. wet bulb (dotted line) gives 12.48 cub. ft. on Scale D.

$$\frac{20 \times 30}{12.48 \times 29.92} = 1.6$$ grains per cub. ft. of blast.

Refer to Fig. 3.—Find intersection of 9,500 cub. ft. (horizontal line) and 1.6 grains (sloping line). A vertical line to bottom of chart from this intersection shows that 160 lbs. of coke should be added to base coke charges each hour.

The table on Fig. 3 shows that for 1.6 grains the blast should be increased 1.5 per cent. Correcting this figure to observed conditions by means of the result already obtained from Fig. 1 gives: 1.5 × 95/100 = 1.4 per cent.

9,500 + 9,500 × 1.4/100 = 9,630 cub. ft. per min.

APPENDIX

Derivation of Charts

Fig. 1.—The nomogram of temperature, pressure, and volume is based on the simple gas law:—

$$\frac{T_{DB} + 460}{520} \times \frac{29.92}{B} \times 100 = V$$

Where T_{DB} = temperature in deg. F.;
B = barometer in inches of mercury;
V = per cent. of normal blast.

To convert barometer reading to any other scale, the following relationship may be used: 29.92 in. of mercury = 760 mm. of mercury = 14.7 lbs. per sq. in. = 1 atmosphere.

* If no compensation is made for variations of weight of oxygen in a given volume of air, the cupola efficiency will vary somewhat with atmospheric conditions. The base figure is obtained by observing the blast volume on a day when the cupola performance is particularly good, and figuring backwards from the charts, or the equations in the Appendix, to obtain the equivalent amount of dry air at standard conditions. Changes in base figure should be made whenever the coke or metal, qualities or ratios, are changed. All such changes should be made very gradually, optimum blast volume being chosen on basis of metal temperature, fluidity or castability, etc., melting losses, and coke consumption.

† Base coke charge is obtained by subtracting the coke correction from the actual amount of coke charged on a day when the cupola performance was judged to be good.

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Fig. 2.—The nomograms of wet bulb temperature, dry bulb temperature, and humidity are based entirely on data taken from the Psychrometric Charts of the form developed by W. H. Carrier and the Keenan Steam Tables, both widely published in the literature.

Fig. 3.—The relationship between humidity, blast rate, and lbs. of coke per hour was calculated as follows:—

1.—$H_2O + C = CO + H_2$.

2.—18 + 12 = 28 + 2 lbs. of reactants.

3.—57,800 = 29,380 + heat for reaction, Calories (H_2O in gaseous state).

4.—57,800 − 29,380 = 28,420 × 1.8 = 51,200 B.Th.U. = Heat required for dissociation of 18 lbs. of water vapour.

5.—0.9 = 90 per cent. fixed carbon in coke (assumed).

6.—(from 2 and 5) $1 \times \frac{12/18}{0.9} = 0.741$ lbs. coke per lb. water vapour to dissociate water vapour.

7.—850 deg. F. = temperature of gas at cupola charging door (assumed).

8.—8.6 B.Th.U. = Mean molal heat capacity of H_2O gas between 850 and 60 deg. F.

9.—13,100 B.Th.U. = Heat per lb. of 90 per cent. C coke burned.

10.—0.50 = Average cupola thermal efficiency under favourable operating conditions. Reliable determinations show that approximately half of the heat of combustion is wasted by being carried away in gases and slag and by being lost through endothermic reactions or by radiation and conduction.

11.—(from 7, 8, 9 and 10) $\frac{1 \times (850 - 60) \times 8.6/18}{13{,}100 \times 0.50}$ = 0.058 lbs. coke per lb. of water vapour to heat water vapour to charging-door temperature.

12.—(from 4, 2, 9 and 10) $\frac{1 \times 51{,}200/18}{13{,}100 \times 0.50} = 0.435$ lbs. coke per lb. water vapour to supply heat for endothermic reaction.

13.—(from 3, 11 and 12) 0.741 + 0.058 + 0.435 = 1.234 total lbs. of coke per lb. of water vapour.

14.—1.234/7,000 = 0.000176 total lbs. of coke per grain of water vapour.

15.—0.000176 × cub. ft. of blast per hour × grains H_2O per cub. ft. of blast = lbs. of coke per hour.

Correction of Blast Volume for Humidity

16.—H = Grains of water per cub. ft. of blast.

17.—379 = Cub. ft. per mol. of any gas at 60 deg. F. and 29.92 in. of mercury.

18.—$\frac{H \times 379/18}{7{,}000} = 0.003\ H$ = mols. of vapour per mol. of blast.

19.—6.72 = lbs. of O_2 per mol. of dry air.

20.—(1 − 0.003 H) × 6.72 = lbs. of O_2 per mol. of blast.

21.—$\frac{6.72 \times 100}{\text{Lbs. of } O_2 \text{ per mol. of blast}}$ = per cent. blast for normal O_2.

22.—Assume 10 per cent. CO_2, by volume, in stack gases (average good practice), then
14.9 per cent. = CO_2 by weight.
15.8 per cent. = CO by weight.
1.82 per cent. = lbs. O_2 per lb. of carbon.

23.—(from 16, 11, 12, 22, 5, 20 and 17)
$$\frac{H/7{,}000 \times (0.058 + 0.435) \times 1.82 \times 0.9 \times 100}{(1 - 0.003\ H) \times 6.72/379}$$
= per cent. blast to burn additional coke.

Adding the blast percentages gives the per cent. of normal blast to correct for humidity. The above calculations are based on standard conditions, and to be absolutely accurate the percentage blast correction should be multiplied by the correction for temperature and barometer, as given in Fig. 1. The assumed figures of charging door temperature, thermal efficiency, per cent. CO_2 in stack gas, and per cent. C in coke are believed to represent average good practice. Where these figures have been determined for a certain cupola, the actual values may be substituted in the above equations and the scales of Fig. 3 changed accordingly.

Testing of Aluminium Castings.—A study of the effect of casting conditions on the mechanical properties of aluminium castings carried out by Prof. Dr. A. von Zeerleder ("Giesserei," January 9, 1942), shows that in forging and particularly in casting a marked variation in mechanical properties can be found between different parts of a single casting. Discussing this in the light of practical examples, the author concludes that a cast-iron test bar does not give entirely reliable and exhaustive data of the mechanical properties of the casting itself. A separately-cast test bar affords much better information of the quality of the metal used in casting.

Waste Paper is a Strategic Material

PRODUCTION OF UNIFORM STEEL FOR A LIGHT-CASTINGS FOUNDRY

MR. W. H. SALMON, in a written contribution to the Paper by C. H. Kain and L. W. Saunders, "The Production of Uniform Steel for a Light-Castings Foundry," read at the recent annual conference of the Institute of British Foundrymen in London (see FOUNDRY TRADE JOURNAL for July 23), writes:—

"The authors have made a noteworthy contribution to the available information on methods of producing carbon steels for foundry purposes. They are fortunate that they have been able to combine the two processes, basic electric and Tropenas, in one foundry, so that they have no need to rely on outside scrap of unknown or variable sulphur and phosphorus content for the converter process. They are apparently still more fortunate in the freedom from those delays on the electric furnaces which frequently upset the most generous time schedules. The production of a heat regularly every four hours is a great achievement on a hand-charged furnace, considering the delays which may be encountered from broken electrodes, lining and roof troubles, waiting for finishing analysis, and the hundred and one events that arise to upset the programme planned by the foundry to keep pace with mould production. The time saved on analysis alone must make a great difference to the power consumption and cost of steel.

"When one is accustomed to a foundry where as many as thirty-four different steel analyses are required in a week's programme, the problem of setting out moulds for heats of two steels only, namely, 'hard' and 'soft,' would be Utopia to our casting team. Probably the factor of simplification of number of steels made and the fact that the authors can cast the rows of moulds in the production lines with either basic electric or Tropenas steel, have had as much to do with the increased output from the foundry floor as the adherence to standard charges in the furnace.

"The authors seem to have overcome the adage, 'Good steel cannot be made in a hurry,' by taking care to make the electric furnace and cupola charges consistent from heat to heat. Having had an opportunity of seeing a number of their steel castings after machining, there is no doubt that the steel they supply to the foundry is excellent for casting purposes.

"It is noticed that the authors have omitted the Izod test from the test results printed in Table A (page 6 of preprint). It would be of interest to have on record the amount of aluminium added to the ladle (electric and Tropenas) and the corresponding impact tests, particularly if they can give further support to the opinion that there is a critical amount of aluminium addition which produces low ductility and impact resistance, but that further additions result in a great improvement in the Izod test values.

"The authors refer to lack of fluidity in certain types of electric furnace and Tropenas heats, in both cases they associate this condition with an unsatisfactory boil leading to a high proportion of non-metallic inclusions. Taylor, Rominski and Briggs (A.F.A. 1941) have shown that quite small percentages of titanium, vanadium and molybdenum (and larger additions of aluminium) seriously impair the fluidity of cast steels. These elements have a higher heat of oxide formation than the elements (silicon, nickel and copper) which improve fluidity, and it is reasonable to assume that because the oxidation products of Ti, V, Mo and Al will be in a fine state of dispersion, they will have an inoculant effect in promoting more rapid freezing. The 'considerable proportion of inclusions' reported by the authors in non-fluid heats must be in an extremely fine particle size, because they (the authors) allow ample time for larger particles to rise out of the molten steel, and this cloud of tiny nuclei may be the reason for the lack of fluidity in certain heats. The time they let the electric furnace heats stand with the power off to allow the slag to float out before tapping, the inclusion of a special slag trap in the furnace launder and the fact that they do not reduce the sulphur to the degree required for certain ingot heats, are three factors which will tend to make the fluidity of their basic electric steel comparable with Tropenas steel."

Weldings and Castings.—An excellent letter from "Castings" was recently printed by the "Manchester Guardian," which presented a well reasoned argument for the retention of castings under many circumstances. *Inter alia*, "Castings" states that "in many foundries 90 per cent. of the labour is female."

Light Alloys.—The 3 per cent. Mg aluminium alloy has a high corrosion resistance, especially towards sea water; according to data given by P. BASTIEN in "Usine," chill castings of this alloy have a tensile value of 24 to 28 kg. per sq. mm. and 12 to 18 per cent. elongation, corresponding values for sand castings being 20 to 24 kg. per sq. mm. and 2 to 6 per cent. elongation. Heat-treated alloys include, in addition to Special Silumin, the alloys AP 33 with 4.5 per cent. Cu, 0.45 per cent. Ti, and traces of Si and Fe, and A.P.M. with 4.5 per cent. Cu, 0.2 per cent. Mg, and traces of Si and Fe. The form-filling factor of these alloys is low; they also exhibit hot brittleness.

WEST YORKS SPECIMEN CASTING

IV.—Potential Defects

At the March meeting of the West Riding of Yorkshire Branch of the Institute of British Foundrymen, held at Bradford Technical College (Mr. W. Fearnside presiding), the fourth discussion relating to the various phases in the production of the specimen casting selected by the Council, took place. On this occasion, Mr. H. Balme dealt with the potential defects in the specimen casting. Previous contributions were published in the "Foundry Trade Journal" of January 22, February 19 and April 23 last.

In his address, Mr. Balme considered the potential defects in the casting on the basis of their three main causes, *viz.*: (1) Moulding faults, (2) core-making, and (3) metal used.

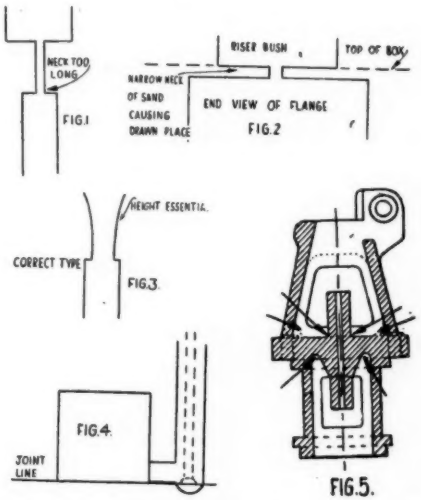
Moulding Faults

It is self-evident that the sand, box parts and pattern must be entirely adequate for the job in hand. In the case of a one-off job, it would probably be given to a side bay moulder, who would use sand which would be tough, heavily milled and highly bonded. The possible defects would include:—(1) Scab against the runners; (2) sand holes arising from scab, probably in a position to be machined; (3) drawn places, *i.e.*, externally at the corners and particularly against the flange, due to gas pressure. These defects are also likely to occur from other causes, such as over-wet sand, whilst drawn places —due to gas pressure—may result from excessive coal-dust content. Such defects are also likely to occur in quantity production, if similar sand was used, with the added defect of misshapen castings in the case of jolt-machine-made moulds, due to the poor packing qualities of such a sand. The following remedies are suggested:—The use of a sand of high permeability, and reasonable moisture content, say 5 per cent. for loose pattern work and 3 per cent. for machine moulding.

For the running of the casting, a dirt trap is an essential. Rod feeding being out of the question, some form of self-feeding is called for, and Figs. 1 and 2 show potential mistakes, whilst Figs. 3 and 4 illustrate good practice.

Core-making

The prime requisite of cores is that they must be true to shape, for ill-fitting ones cause thick and thin sections in the castings, where uniformity is essential. This applies especially to the shape and position of the spigot boss on which the valve operates when working. Mr. Timbrell's Paper stressed the necessity for avoiding coreboxes of too fragile a construction, and indicated the potential defects arising therefrom. Outstanding amongst potential defects, however, are those due to insufficiently dried cores, giving rise to gas pressure, and the creation of hot spots. The creation of these is indicated in Fig. 5. The importance of well-dried cores was shown by an experiment with an apparently adequately dried core having a permeability factor of 136, which evolved 13.5 ml. of gas per gramme of core at N.T.P. This core, after redrying at the correct temperature, had its permeability improved to 274, and the gas evolution was reduced to 1.5 ml.



Where chills are used with cores, the following defects may occur:—(1) Gas holes resulting from poor chill preparation; (2) difficulty of securing in the cores; and (3) blows from the joints between chills in two half-cores.

Metal Used

The composition, as outlined in an earlier Paper, is characterised by low total carbon; medium silicon (1.7 to 1.8 per cent.); fairly high manganese and low sulphur and phosphorus. The objects are to ensure finely distributed graphite; close-grained, yet machinable, metal; and a reasonable freedom from phosphide segregations. No criticism is offered and alternative composition suggested, but it is germane to point out the potential defects of such a metal ready for casting. Even charging of

West Yorks Specimen Casting—IV.

the cupola is assumed and, if small and thin steel be used, it should form the last material of the charge, whilst heavy steel scrap should be the first. Considerably more coke will be required than for high phosphorus mixes, because (1) the necessity for the provision of free carbon to be absorbed by the steel, involving a reducing atmosphere; and (2) to provide a compensation for the inefficient production of heat under reducing-atmosphere conditions. The blast must be "soft" to ensure the reducing-atmosphere condition, and it should be appreciated that repeatedly inducing off-on conditions results in excessive carbon pick-up and a very irregular melting rate. This latter factor is important because a controlled melting rate is essential to ensure a true mix uncontaminated by the preceding or the following charges. It is worthy of note that it might be difficult to use up the oven metal, as medium-sectioned work might give trouble in the machine shop. It would seem advisable not to use all the metal melted. The metal might be "dull" before the last mould is cast, whilst, when using hand shanks—the last of which to be used should be especially well dried—there will be a difference of composition, attaining a maximum amplitude in the first and last to be used.

DISCUSSION

The BRANCH-PRESIDENT (Mr. W. Fearnside) said they were indebted to Mr. Balme for pointing out what were undoubtedly possible defects which would be liable to arise in any foundry producing this specimen casting on the drawings and specifications as submitted.

MR. W. G. THORNTON (Past-President) agreed with Mr. Balme as to the tapered riser on top of the flange, as the only real method of feeding this job. An alternative was to place the runner on the top of the round flange and tap.

MR. BALME said that if he, personally, were making this casting, he could make it quite sound without using a riser. Moreover, the riser might be one of the causes of a potential defect.

MR. THORNTON said that under similar conditions he would use a pencil runner and eliminate the riser.

Running Conditions

MR. H. FORREST pointed out that those used to dealing with a material with a short feeding range knew what to expect and took steps to overcome the resulting defects very quickly, but for those habitually handling high phosphorus iron it comes rather as a shock to find half the metal has been taken from the ladle and the rest is useless. It was essential to keep in mind that this metal might have a very short freezing range and have everything arranged so that the metal could be run off as quickly as possible. He disagreed with Mr. Thornton's idea that pencil runners would be suitable to the type of metal advocated in this case. On the question of risers, also, there was only a short neck of metal to reach the centre boss, and where was the liquid feed to take place so necessary for the centre, because it had later to be drilled with a very small hole? It was essential to provide the metal with some liquid feed.

MR. THORNTON said he still maintained that a pencil runner would serve if the job was cast as hot as possible.

MR. FORREST pointed out that the chill in the centre had to be bored out. Therefore, to allow $\frac{1}{16}$ in.—which was cutting it very fine considering it is a fairly long hole—means that any chill would have to be small. If that chill bends or is not perfectly round as a casting before it is introduced, there will be some "wandering" of the drill.

Alloyed Iron Suggestion

MR. NICHOLLS, referring to the composition of the metal, said the specification called for an 18-ton per sq. in. iron. One would expect with this design to get numerous gas-holes. It has been stated that the metal used should be a low carbon iron and naturally had a shorter freezing range, and therefore the gases were more likely to be trapped. He suggested using a composition of about 3.3 per cent. carbon, and if there was no drawback on grounds of cost, he would use a nickel-chrome iron to allow the gases more time to escape. Personally, he would make the casting from the last charge to ensure the correct composition. The job should be run as quickly as possible in the hottest metal, which would guarantee a reasonable low carbon content of about 3 per cent.

MR. BALME, agreeing, said the method outlined would be the ideal one, but in many a foundry it would probably be out of the question in practice. As to topping up the riser, no doubt the ideal method was to top up if it could be adjusted correctly, but personal experience was that it was not easy to get it exactly at the right height, and that was where one was liable to get a hot spot.

MR. NICHOLLS said the liquid was bound to find its own level, and, if this feeder was controlled, he did not think a great deal of metal would be forced back into the casting.

MR. BALME said Mr. Nicholls had suggested as

West Yorks Specimen Casting—IV.

suitable for this type of job a nickel-chrome mixing, but that alloy would have to be added at the spout, and that was not easy if it was not being used on other jobs at the same time.

MR. NICHOLLS said that, naturally, if a nickel iron was used, it would necessitate the silicon being reduced by a corresponding percentage. The object in suggesting nickel was that it would give a better chance to eliminate the gas-holes by allowing a greater time for the gases to escape. He would add the nickel at the spout. If there was any question of the metal being dulled, this could be overcome by varying the composition of the charge and making the necessary additions of silicon, etc., so that the temperature of the metal would not suffer at all. In answer to a remark by the previous month's lecturer (Mr. George Burgess) on the subject of alloys, Mr. Nicholls said the fact that nickel was a graphitiser should help to maintain the feed.

MR. FORREST said he could hardly agree with the last speaker's implication as to increased fluidity of nickel iron. Personal experience was to the contrary, and that it tended to shorten the feeding range and caused a lack of fluidity. He doubted very much whether it would materially help the temperature of the metal in the ladle, though he agreed to a great extent that one could use pencil runners and make a successful casting that would normally be run fairly fast. In a previous lecture the question of adding nickel was referred to, and whilst not everybody might be in a position to add nickel-chromium or molybdenum to a one-off job, it was agreed that it would be useful to add molybdenum to a one-off job, though it might not be worth while to use chromium in such a case. It was not suggested that nickel would increase the fluidity or be a cure for shrinkage.

A MEMBER said that, assuming a good iron and hot melting, with the metal running reasonably fluid and casting quickly, no trouble should be experienced. If it was cast dull—if it solidified at one side—there would be spongy places. He would certainly eliminate the riser and let the metal take care of itself.

MR. J. BLAKISTON said the lectures in this series had been more than valuable, but it is perhaps a little unfortunate, to complete all points of view, that nobody representing consumer interests had participated. Another matter on which the series of lectures had not touched was the fettling—an aspect which also affected the consumer.

MR. J. POTTER said he felt the most likely trouble in this particular case was perhaps in the centre boss. The flange was very thin and that metal was liable to set first. How were they going to feed that centre boss really satisfactorily? The practical way, he thought, was by having a thicker centre or some very small risers. One trouble which had not been mentioned was that of getting the job pressure-tight. They would not, he believed, get the boss pressure-tight unless they used a thicker centre and, to his mind, only an outside chill in the core would render the metal sound in the centre.

Vote of Thanks

MR. F. OLDERSHAW moved a vote of thanks to Mr. Balme for what they must all agree had been a very careful review of the various potentialities of defects in the job under consideration. It did not follow that all these defects must necessarily occur, but the possibility of each or any of them was always there and must be guarded against.

MR. CHARLES HALL, seconding, said he agreed with the suggestion that the centre section needed more thickness. As it stood, he felt there would probably have to be some compromise between the foundryman and the machine-shop man.

BEARING SUBSTITUTES

Everything that moves requires bearings of a certain type, and the demand is ever increasing for bronzes in the form of cast bearing bushings, says a writer in "Steel." Examining the work done in foundry substitutes for materials in short supply, he recalls that plastic bushings have appeared, and their field of use may be expanded, especially for civilian uses. Steel-backed bushings lined with white metal are in considerable use, and their field can be more fully developed. Many improvements have been made on lead-base alloys as a substitute for tin-base bearings. The demand for steel-backed bushings with thin linings of bronze or copper-lead and those with sintered bronze linings is increasing. The latter may be employed to considerable advantage where the load requirements are not extreme. An inherent property of these powdered metal bearings is that they can be used with much greater safety in places where oiling is difficult or impractical. They are also the most economical to manufacture from the standpoint of raw materials, as the applied thickness of the lining material closely approaches the finished size, thus much reducing the machining loss.

New American Cast Tin Bronze Specifications.—As a further step in conserving strategic metals, new emergency alternate cast tin bronze specifications have been approved by the A.S.T.M., which permit a substantial saving in tin for more vital use in the war effort. The use of secondary metals is emphasised by the specifications.

TESTS ON THE CORROSION OF BURIED FERROUS METALS

An interim report of the Corrosion Sub-Committee of the Iron and Steel Institute on the Corrosion of Buried Metals is to be submitted to the next Autumn Meeting of the Institute. The report deals with researches on the corrosion of buried metals conducted by the Corrosion Committee. The work is intended to precede the more extensive investigation contemplated by that Committee in collaboration with the Sub-Committee on Soil Corrosion of Metals of the Committee on Soil Corrosion of Metals and Cement Products of the Institution of Civil Engineers, who during the last year have made a grant in aid of the research.

Experiments on various irons and steels buried in clay soils at Binfield, near Wokingham, for three years are first described. The rate of general corrosion, even in these reputedly corrosive soils, was low, about 0.0015 in. per year, and, in agreement with previous tests in the United States, no appreciable differences were found in this rate for ordinary ferrous materials, *i.e.*, cast irons, structural steels and wrought irons. In particular, the presence of low percentages of copper and/or chromium in steel or wrought iron had no effect on their resistance to corrosion under these conditions.

Data have been obtained for the effects of depth of burial and other factors on the corrosion rate, which will be of value when arranging future tests. It is shown that the experimental error is greater in this type of test than for corrosion tests under other conditions of exposure and it is concluded that future tests should be made in triplicate at least.

Samples of soil from the exposure sites were subjected to chemical, physical and microbiological examination, but it was not found possible to correlate the results of the corrosion tests with any of the soil characteristics. Sulphate-reducing bacteria were present in appreciable numbers in all the samples except one.

Work is reported on a method of determining the relative corrosiveness of soils by following the change in the electrical resistance of buried coils of wire due to corrosion. It is demonstrated that it is practicable to determine the resistance in the soil itself and that this resistance increases proportionately to the corrosion. Although the results obtained may not be strictly representative of the behaviour of massive materials such as pipes, it is hoped that the method will prove a convenient means of comparing the corrosiveness of different soils.

The Paper concludes with suggestions for a continuation of the work. It is suggested that this should mainly take the form of developing the electrical-resistance method of testing. Experiments to date have been artificially accelerated by electrolysis. It remains to be shown that the method will respond suitably to the slower changes due to corrosion under natural conditions in the soil, and to correlate determinations made in this way with the more usual loss-in-weight tests on massive specimens. The report has been compiled by the investigators, Dr. J. C. Hudson, Dr. T. A. Banfield and Mr. H. A. Holden.

PATTERNMAKING WRINKLES—I

By "CHIP"

Although most hand planing of timber has been eliminated from modern patternshops, a large number of smaller shops connected to jobbing foundries still depend on the use of hand planes. These are of many varieties, and invariably iron "jointers" are used to the exclusion of the old time wood "try planes." The advantage of the former are many, among which is the ease and accuracy by which the blade can be adjusted and also the rigidity in use resulting from its weight. Some craftsmen prefer the tool to be lighter, especially if much planing has to be done, and so have had a series of grooves machined out of the bottom of the jointer. A method whereby friction can be reduced is to keep on the bench in a suitable place a small tin box filled with a fibrous substance saturated in machine oil. Before commencing to use the jointer on the timber the front end of it is touched by the oily substance previously mentioned, and results in the

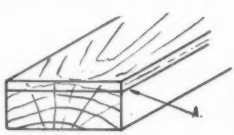


FIG.1.

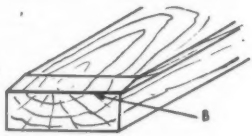


FIG.2.

work being much easier. Another advantage of the metal jointer is that it remains "true" over a much longer period than a wood try-plane. The latter to be efficient must be "trued" periodically. To accomplish this a cut is taken off the face by another plane. When doing this the wedge of the plane being trued should be in position, otherwise in use the tightening of the wedge would cause the face to spring somewhat and thus impair its accuracy. After a surface has been planed and tested and found true one edge is "shot," that is, is made straight and at right angles to the first face. The thickness required is then gauged on as Fig. 1, where A is the gauge line. To ensure the piece being correct it is necessary for the gauge line to be entirely removed. One difficulty often experienced by beginners is that the material is removed irregularly. A method whereby the workman can see at a glance—while he is using the plane—if he is removing too much from one spot is to cut the ends, as Fig. 2, with a paring chisel, entirely removing the gauge line, and then making a black-lead line at the very edge, as B. This line must not be removed until the final cut, otherwise the piece will not be parallel.

Madagascar Graphite.—Madagascar is the largest producer of flint graphite in the world, and also produces large quantities of ground graphite. The graphite is used mainly in the manufacture of melting crucibles, and to a small extent in the manufacture of electrodes and lubricants. Output in 1940 was estimated at around 10,500 tons of flint graphite and about 4,250 tons of ground graphite.

STANTON

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REFINED

PIG IRON

IS CHARACTERISED by closeness of grain structure, uniformity of composition and fine graphitic carbon evenly distributed.

IS PRODUCED to guaranteed analysis in seven standard grades.

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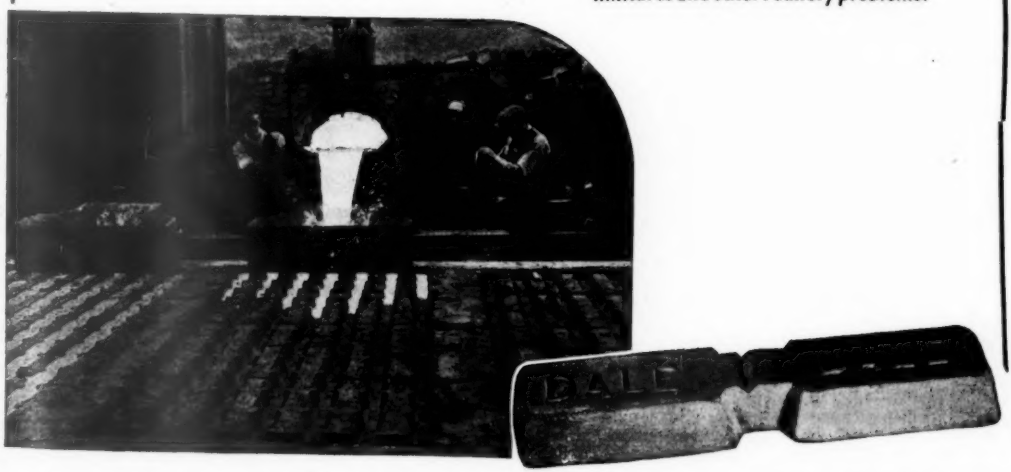
SHOULD BE USED to tone up high phosphorus irons and scrap, to replace Hematite, and to produce castings for all high duty purposes.

Users are invited to avail themselves of the Stanton Technical Service which offers free expert advice on special mixtures and other Foundry problems.



THE STANTON IRONWORKS COMPANY LIMITED, NEAR NOTTINGHAM

BOOK REVIEW

Administration of Labour—An Essay on Problems of Social Economy, by F. Klang, V. Outrata, and A. Kunosi. Published by George Allen & Unwin, Limited, London. Price 3s. 6d. net.

The title of this book is ill-chosen, for taken literally it covers such activities as group incentives, payment by results and kindred subjects. The reviewer suggests that "Administration through Labour" would be more appropriate, for the theme is that post-war reconstruction should be centred around "the organised provision of the means of subsistence to every individual." The authors are Czechoslovaks, and the text reveals them to be profound students of social economy reinforced by no mean knowledge of law. This knowledge is used very effectively to show how the law in the past has been related to what were, and no longer are, bilateral agreements for labour performance, and how in future it is to be so oriented as to achieve the "organised means of subsistence for every individual" whilst retaining freedom in the democratic sense. This is no easy matter, as it has to provide remedial measures for both exploiters and shirkers. A cardinal feature in the system outlined is international co-operation for the ensuring parallel conditions to be world wide, coupled with balanced production. The value of the book lies in the drawing of the attention of the reader to the legal background necessary for all these evolutionary changes, for most people have given insufficient attention to it. The "competency" of bureaucracy—that is the overlapping of Government departments such as the exterior of an air raid shelter being the business of the Board of Trade and the interior that of the Ministry of Home Security—is related to both the old "liberal" conditions and to those which are expected to come about under a newly planned world. At a period when both industrialists and workers are being invited or compelled to surrender all their rights to a bureaucracy—even though it be a democratic bureaucracy, it is evident that the authors had good reason for focussing the spot-light on the competency of the civil servants. The book from this angle will interest readers, who—and they represent the majority of the population—have no sustained preoccupation with politics.

CATALOGUE RECEIVED

Carbon Determination in Steel.—A four-page leaflet received from Griffin & Tatlock, Limited, of Kemble Street, London, W.C.2, and elsewhere, announces that since the war they have designed and placed upon the market an improved type of Strohlin apparatus, which is capable of accurately determining the carbon content of steel in about one minute. The method used is clearly described and the extra spare parts, for not only the new apparatus but also the original German one are separately priced. The pamphlet is available to our readers on application to the London address.

NEW PATENTS

The following list of Patent Specifications accepted has been taken from the "Official Journal (Patents)." Printed copies of the full Specifications are obtainable from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 1s. each.

545,122 BUDD INDUCTION HEATING, INC. Method of and apparatus for heat-treatment by electromagnetic induction.

545,139 MOND NICKEL COMPANY, LIMITED. Production of steel castings.

545,149 SEAILLES, J. C., and DYCKERHOFF, W. R. G. Process for recovering alumina.

545,155 BABCOCK & WILCOX, LIMITED. Furnace wall tubes.

545,163 GENERAL MOTORS CORPORATION. Heat-treating apparatus.

545,175 ELECTRO MANGANESE CORPORATION. Processes of electrodepositing manganese from solutions of its salts.

545,190 EVERY, C. E. (Titanium Alloy Manufacturing Company). Enamelling compositions and the like, and method of making the same.

545,194 SHORTER PROCESS COMPANY, LIMITED (Linde Air Products Company). Surface-hardening of metal articles.

545,200 CONSTRUCTORS, LIMITED, and FINER, H. J. Construction of perforated metal bar members of angle section.

545,210 WILLIAMS, J. C. Pipe joints and like couplings.

545,211 LINDE AIR PRODUCTS COMPANY. Method of and apparatus for removing metal or scale from the surface of ferrous metal bodies.

545,220 THOMAS, N. H., and LONDON PASSENGER TRANSPORT BOARD. Tool for straightening or bending metal wire, tube, bar, and the like.

545,239 JENNINGS, H. W. K. (Titanium Alloy Manufacturing Company). Zircon refractories and refractory compositions, and methods of making the same.

545,255 BIRMINGHAM ELECTRIC FURNACES, LIMITED, and HIPKINS, E. C. Salt baths for the heat-treatment of metals.

545,256 SHORTER PROCESS COMPANY, LIMITED (Linde Air Products Company). Apparatus for surface-hardening metal articles in succession.

545,258 CONSOLIDATED MINING & SMELTING COMPANY OF CANADA, LIMITED. Apparatus for sintering ores and the like.

545,268 BRADLEY, P. R. Machines for pressure casting.

545,269 ELECTRO METALLURGICAL COMPANY. Manufacture of hardenable steels.

545,312 INTERNATIONAL ALLOYS, LIMITED, and PRYTHERCH, W. E. Method of and apparatus for the production of magnesium.

545,418 UDY, M. J. Production of iron or iron alloys.

545,458 INTERNATIONAL ALLOYS, LIMITED, and PRYTHERCH, W. E. Production of magnesium from magnesium-bearing materials.

SHOTBLASTED

To an airman, that is what some German factory will be when these bombers fly home. But to Foundrymen the world over, it means the components of the planes, emerging from a Tilghman Shot Blast plant (or probably an Airless Wheelabrator in these days of huge production), cleaned and ready for anything. They know what they're talking about!

Fairey Battles "peeling off" to bomb.

TILGHMAN'S PATENT SAND BLAST CO., LTD.

17 GROSVENOR GARDENS, LONDON, S.W.1.

A22M.

NEWS IN BRIEF

BUICK MOTOR COMPANY division of General Motors is building a large aluminium foundry to supply the company with aircraft engine castings.

THE KEIGHLEY ASSOCIATION OF ENGINEERS will hold their annual general meeting to-morrow (Friday) at Arcade Chambers, North Street, Keighley.

SINCE JULY 1, the American W.P.B.'s Compliance Branch has been checking the operations of about 1,000 foundries using aluminium. The purpose of the check is to guard against any diversion of this scarce material from war purposes.

THE BOARD OF MANAGEMENT of the British Colour Council, 28, Sackville Street, London, W.1, has sanctioned the publication of a Standard Colour Card for Interior Decoration. Its object is to enable the manufacturers of materials and apparatus for domestic use to harmonise colours, not only in living rooms, but also in kitchens and bathrooms.

A DEPUTATION from the Parliamentary and Scientific Committee has asked the Government to set up a full-time scientific and technical joint board, which would have as its aim the fullest strategic use of scientific man-power and resources and the proper organisation and exchange of scientific and technical information relating to the war effort.

IN APRIL last the Minister of Supply appointed an "authorised controller" to control the undertaking of John Stirk & Sons, Limited, machine tool makers and ironfounders, of Halifax, and transferred all the shares to his nominees. The Treasury has now fixed the price to be paid for the shares at £3 5s. for each ordinary and 12s. 6d. for each preference share.

MR. HANS RENOLD, founder and director of the Renold & Coventry Chain Company, Limited, attained his 90th birthday on July 31. This milestone in a long and eventful life has been marked by the employees of the company by the establishment of a fund to be known as the "Hans Renold 90th Birthday Commemoration Fund," the annual investment income from which is to provide prizes for students of mechanical engineering.

IN AN ADDRESS to the Engineering Industries Association in London last week, Sir William Beveridge urged immediate and far-reaching plans for post-war reconstruction giving security of employment and a decent standard of life as a prime factor in our war effort. The Government should now give an assurance that it would use whatever powers were necessary to maintain employment after the war and it should set up an Economic General Staff to prepare plans, he said.

THE APPEALS by Scottish foundry workers who returned to Falkirk from the Midlands because they were unfit for the heavy work of drop-forging are to be considered by a Ministry of Labour tribunal. The men, experienced in light castings, stated they were physically incapable of tackling the heavier tasks in the Midlands. They have been given temporary jobs pending the appeal. The referees' court has cancelled the Ministry of Labour directions in cases where personal hardship was proved.

NEW TRADE MARKS

The following applications to register trade marks appear in the "Trade Marks Journal":—

"ESPREE"—Hand tools. SURREY PRECISION TOOL WORKS, River Road, Barking, Essex.

"JOE"—Hand tools. JOE H. SMITH & SONS (OLDBURY), LIMITED, Roway Lane, Oldbury, Worcs.

"CLYDE ALLOY"—Alloy steel. CLYDE ALLOY STEEL COMPANY, LIMITED, Shields Road, Motherwell, Lanarkshire.

"TYPHOON"—Reamers (hand tools). B. ELLIOTT & COMPANY, LIMITED, Victoria Road, Willesden, London, N.W.10.

"MAGNA-CUT"—Steel, machine tools, hand tools, etc. WATSON, SAVILLE & COMPANY, LIMITED, Mowbray Street, Sheffield, 3.

"NORSTEL"—Bending and straightening machines, plate and bar rolling machines, cranes, conveyors, etc. NORTHERN STEEL SCAFFOLDS, LIMITED, 29, Park Avenue, Southport.

"CONNY"—Heat insulating material, engine, machine, pump and hydraulic packing and jointing material, etc. POWER HOUSE COMPONENTS, LIMITED, Albion Chambers, King Street, Nottingham.

"DURALUMIN," "DURALUMIN A," "DURALUMIN B," "DURALUMIN G," "DURALUMIN H," "DURALUMIN T"—Aluminium and alloys thereof, and articles made of aluminium or of aluminium or common metal alloys. JAMES BOOTH & COMPANY (1915), LIMITED, Argyle Street, Nechells, Birmingham, 7.

OBITUARY

MR. WILLIAM BRYDON, who has died at Leith, was head of the firm of W. H. Brydon & Company, engineers and welders.

MR. WILLIE PRATT, for 40 years a director of F. Pratt & Company, Limited, engineers, Park Works, Halifax, died on July 27.

MR. JAMES OGG LAING, managing director of H. W. Hunter & Son, Limited, lead pipe manufacturers and metal merchants, of Edinburgh, died recently. Mr. Laing commenced work with the firm as an office boy in 1884.

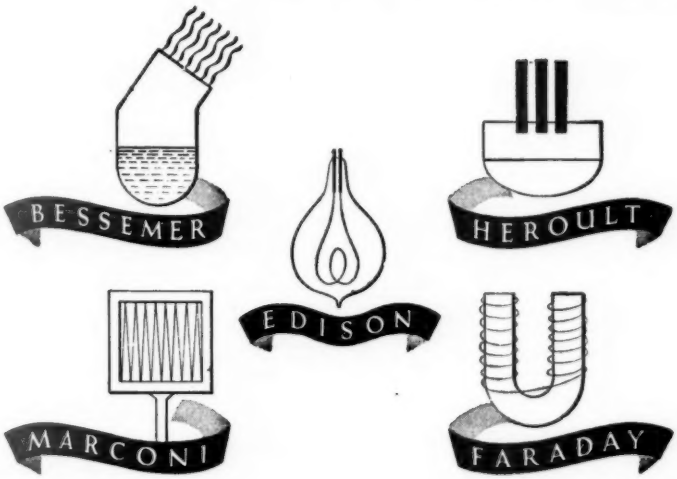
MR. WILLIAM THOMAS PREST, who had been associated with Newcastle Quayside as a metal merchant for many years, has died at Gosforth, Northumberland. He was 64 years of age. Mr. Prest, who retired six months ago, started his career with Plummer & Company, metal merchants, and eventually took over the firm's interests.

W. & T. AVERY, LIMITED, Soho Foundry, Birmingham, have called meetings for August 11 to amend the articles of association and to subdivide the 5 per cent. cumulative "A" preference £5 shares into £1 shares. It is then proposed to convert the issued 5 per cent. cumulative "A" £1 preference, 5½ per cent. cumulative "B" £1 preference and the ordinary £1 shares into stock.

SEVEN PILLARS OF PROGRESS

3. All nations and all classes of society have contributed to the knowledge and utilisation of national resources.

"The Charter of Science"—British Association, 1941



Science is the monopoly of no continent, no nation, no creed, no class, but is the urge throughout mankind for a knowledge of the material forces of nature and the application of these to useful purposes. Early science was fragmentary as scientists had not begun to link up their discoveries. Frequently a significant observation lay dormant until it was re-discovered and correlated with newer facts. Freedom to interchange scientific knowledge has given each fresh worker a background from which to advance—the availability of all that has been discovered before him. So the great industrial organisations, through their research workers and technicians, are constantly in touch with progress in all parts of the world. Before a new plant is built, or a new process devised, the world's knowledge is pressed into service to ascertain the best methods of procedure. Not until all the information has been sifted and examined is the plant built or the process launched. It is in this way that The United Steel Companies are able to offer the fruits of their own knowledge and experience coupled with that of the best practice throughout the world.

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U.S.P. 3

COMPANY NEWS

(Figures for previous year in brackets.)

A. & J. Main—Dividend of 10% (same).

Shanks & Company—Interim dividend of 3%, less tax.

Josiah Parkes & Sons—Interim dividend of 4% on account of 1942.

Warner & Company—Final dividend of 3½%, making 6% (same).

Davy & United Engineering—Net profit to March 31 last, £52,538 (£51,659); ordinary dividend of 7½% (same).

Darlington & Simpson Rolling Mills—Net profit for the year to March 31 last, £59,804 (£53,290); dividend of 7½% (same).

William Denny & Bros.—Profit, £84,117 (£70,483); to general reserve, £30,000 (same); war damage contribution, £8,434 (nil); ordinary dividend of 10% (same); forward, £13,207 (£7,524).

Wellman Smith Owen Engineering—Net profit, £81,914 (£77,019); taxation, £45,000 (£41,800); final dividend of 5%, making 10% (same) for the year to March 31 last, and a cash bonus of 2½% (same).

Crossley Bros.—Profit for the year to April 30, £67,733 (£48,808), after £20,000 (same) for depreciation; taxation, £20,000; to general reserve, £10,000 (same); dividend on deferred ordinary shares of 5% (same); forward, £35,670 (£34,815).

Christy Bros.—Profit for the year ended March 31, £33,436; dividends on investments, etc., £19,802, making £53,238 (£40,262); income-tax, £7,108; to general reserve, £15,000; on the preference stock, £4,500; dividend of 12½% (11%) on the ordinary stock; forward, £25,759 (£23,342).

Consett Iron—Trading profit for the year to March 31 last, £610,613 (£552,238); taxation, £255,000 (£100,000); depreciation, £125,000 (same); war damage contribution, £111,150; debenture interest and sinking fund, £89,083 (£96,235); directors' fees, £6,877 (£6,658); ordinary dividend of 7½% (same); preference dividend, £20,000; forward, £192,713 (£214,448).

Morgan Crucible Company—Trading profit, after providing for depreciation, £536,812; specific reserve no longer required, £62,942; interest on investments and rents received, £37,644; brought in, £2,275; preference dividends, £54,475; interest on 5% obligations, £8,093; ordinary dividend of 2s. per £1 of stock, £107,900; taxation, £400,025; to general reserve, £62,942; forward, £266.

A NOTE BY the Ministry of Fuel and Power addressed to managing directors of some 30,000 industrial undertakings in all parts of the country says that the maintenance of industrial production will depend on improved methods of fuel consumption resulting in a decreased total demand, and the increased use by industry of types of fuel not at present in general demand, of which supplies are less short. The note is accompanied by a special appeal for fuel economy by Mr. Oliver Lyttelton, Minister of Production, who calls for serious attention to be paid to the practical suggestions contained in the note.

PERSONAL

SIR CHARLES CRAVEN has recovered from his recent illness and has resumed his duties as chairman and managing director of Vickers-Armstrongs, Limited, and the English Steel Corporation, Limited.

CAPT. J. B. WOODESON, of the Royal Artillery, who was posted "missing" in the Middle East, is a prisoner of war. Capt. Woodeson is a director of Clarke, Chapman & Company, Limited, engineers, Gateshead. His father is head of the firm.

LT.-COL. R. A. BARTRAM has been elected chairman of the Wear Shipbuilders' Association in succession to Major R. Norman Thompson. Lt.-Col. Bartram is a director of the Sunderland firm of Bartram & Sons, which was established by his great-grandfather at South Hylton over a century ago.

MR. FREDERICK A. MELMOTH, vice-president of the Detroit Steel Castings Company, has been elected chairman of the Detroit Chapter of the American Foundrymen's Association. Before leaving for the United States, Mr. Melmoth held executive positions successively with Brown Bayley's Steel Works, Limited, Lake & Elliott, Limited, and Thos. Firth & Sons.

LT.-COL. N. H. OAKLEY-EVANS, M.C., managing director of Armco, Limited, informs us that he has resigned from the boards of Armco, Limited, British Bundy Tubing Company, Limited, and Engineering & Metals Company, Limited, and that he is no longer responsible for the management in Great Britain of the affairs of the American Rolling Mills, Middletown, Ohio.

Will

LACKIE, J. W., retired iron merchant, of Montrose £23,765

NEW COMPANIES

("Limited" is understood. Figures indicate capital. Names are of directors unless otherwise stated. Information compiled by Jordan & Sons, 116, Chancery Lane, London, W.C.2.)

Rose & Parkin, 24, Great Wilson Street, Leeds—Brassfounders. £3,000. G. F. Rose.

H. Buckle & Sons—Engineers, ironfounders, etc. £500. H. Buckle, Scagglethorpe, Malton.

Maltby's Engineers—£20,000. H. C. Maltby, Hill View, Selborne; G. H. Maltby and J. F. Whidborne.

DR. BRADLEY E. STOUGHTON, president of the American Society for Metals, stated recently that the aluminium industry may use as much as 10 per cent. of all the electricity produced in the United States in the near future.

ENGINEERING BULLETIN No. 13 (JUNE), issued by the Ministry of Labour and National Service, contains an illustrated article dealing with the employment of women in foundries. They are proving their worth as machine moulders, fitters, and die casters. It is stated that, "no protracted training is required for foundry work, and except in actual moulding a woman becomes reasonably efficient within a fortnight.

AVOIDABLE HEAT LOSSES *must be stopped!*

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Raw Material Markets

IRON AND STEEL

Many foundries and steelworks are taking a well-earned break this week, the latter chiefly in order that essential repairs and renewals may be carried out. Steelmakers' commitments are such that they cannot afford to lose any time, but plant has been in continuous operation over a long period, so that it is in the interest of future production that an overhaul be made at this juncture.

Heavy engineering foundries, which have extensive orders on hand for Government departments, are in the market for large quantities of the better-quality irons, but they cannot secure all the material they make application for. The deficieney is made up, however, by liberal allocations of high-phosphorus iron, refined iron, and steel scrap. In this way they are able to cater for the extensive requirements of the Government, who are absorbing practically the full output of the heavy engineers. Official contracts are flowing freely.

The Control authorities issue licences for hematite very sparingly, and only consumers engaged on really essential work are able to procure supplies, and then only if no substitute is available. Low- and medium-phosphorus irons are slightly more plentiful, but are not so easy to obtain as high-phosphorus iron.

In the light foundry trade, conditions are still somewhat dull, and only a small proportion of the works in this section are able to maintain full-scale operations. Concentration of industry plans made by the Government are affecting the light-castings industry to some extent, as they are not being called upon to meet any heavy demands from official sources, while their normal outlets, both home and export, are very much lower than they were before the war.

In the foundry coke market the supply position is such as to permit quite large reserve stocks to be accumulated at many consumers' premises, and full advantage is being taken of the opportunity to lay down stocks against winter needs. For delivery to Birmingham and Black Country stations, the current price of Durham best foundry coke is 69s. 3d.

Carbon and special alloy steels, which are being utilised by armament and munition makers in very large tonnages, continue to be demanded on a considerable scale, and production has by no means reached its peak, despite material expansion in recent months. Producers are stepping up their outputs where possible in order to satisfy the requirements of all consumers. Most other departments of the steel industry are also well employed, plates and other requisites of the shipbuilding, tank, wagon and boiler making trades being absorbed as produced, while other heavy industries are taking up big quantities. Black and corrugated sheets move away promptly, but galvanised sheets can now be made only to Government order.

Iron and steel scrap supplies are still reaching the consuming plants fairly plentifully, and, in fact, there is an accumulation of the inferior grades. Railing scrap, for example, is very easy to procure and many users have placed an embargo on further deliveries for the time being, their yards being considerably overstocked. Heavy steel scrap, however, is wanted still and users would willingly accept increased deliveries, while additional supplies of mixed wrought iron and steel scrap are required by the steel furnaces. Foundries' needs are generally well met, heavy cast-iron scrap coming forward quite satisfactorily.

NON-FERROUS METALS

It is reported that production of tin in the Belgian Congo this year will be over 100 per cent. greater than the average production in 1937, 1938 and 1939; the 1943 output is expected to increase to 130 per cent., while production in 1944 will be increased to 200 per cent. In 1939 the Belgian Congo tin output was estimated to have risen to 9,663 tons (out of a world total of over 184,000 tons), against 9,500 tons in 1938 and only 7,300 tons in 1937.

Further details of the work of the Tin Research Institute in connection with tin economy problems are contained in the current issue of "Tin and Its Uses," published by the Institute and obtainable free of charge from the offices at Fraser Road, Greenford, Middlesex. It is explained that, although in normal times the Institute's purpose is to develop new and improved uses for tin, during the period of scarcity the Institute offers its services in the solution of economy problems. Important economies can be effected in joining lead-sheathed cables both by using a solder less rich in tin and by the use of a new type of joint requiring not more than one-third the quantity of solder needed for the traditional wiped joint. A saving of the order of 99 per cent. can be effected by using a cup and cone type of joint on lead pipes instead of the used wiped joint. The Institute is co-operating whole-heartedly with the Government in cutting down the use of tin, which is necessary, as the enemy at present controls a large proportion of the world's supplies.

Adequate tonnages of copper, lead and spelter continue to reach the armament works and other priority consumers, but strict control is exercised over distribution and all extravagant usage has been eliminated. While fresh supplies are arriving in the United Kingdom satisfactorily, due regard has to be paid to the shipping problem and other vital factors which contribute to the present determination of the authorities to reduce consumption to the minimum.

Recent figures released by the American Bureau of Metal Statistics indicate that some 300,000 short tons of zinc was used in galvanising and sherardising in the United States in 1941, against 286,590 tons in 1940. Electro-galvanising accounted for 7,594 tons last year and sherardising 944 tons. Of the total consumption of 291,085 tons in hot-dip galvanising in 1941, 138,461 tons was used for galvanised sheets, 54,093 tons for pipes and tubes and 32,928 tons for wire.

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PUBLISHED WEEKLY : 21s. per annum (Home and Overseas).

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